



## Analysis of The Effect of Hatha Yoga on The Quality of Sleep and Immune System Among The Students in Public Health Postgraduate Program At UNNES

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### Article Info

### Abstract

#### Article History :


Accepted 10  
December 2017  
Approved 18  
February 2018  
Published 20  
April 2018

#### Keywords:

Hatha Yoga,  
Quality of Sleep,  
Immune System

The sleep quality of a person is said to be good if it does not show any signs of lack of sleep and he or she has no problems in sleeping. Lack of sleep can also cause changes in cytokine tissue. So, the immune system will work less effectively. Hatha yoga exercises is one of the non-pharmacological therapy that can improve the quality of sleep and immune system. The purpose of this study is to analyze the effect of Hatha Yoga exercises on the quality of sleep and immune system among the students in Public Health Postgraduate Program at Unnes. The method used here was quasi experiment with pretest and posttest with control group design. The population in this study was all students in Public Health Postgraduate Program at Unnes. The samples were selected based on inclusion and exclusion criteria by purposive sampling technique. The samples obtained were 24 respondents, divided into two groups to perform hatha yoga exercises in the intervention group. The study instrument used was questionnaire on the quality of sleep and leukocyte examination to find out the respondent's immunity. The study results showed that there was a significant difference in the quality of sleep between the intervention group and control group after the provision of hatha yoga exercises in intervention group with p value of 0.000 ( $p < 0.05$ ) and there was no significant effect on the immunity between the control group and the intervention group after the provision of hatha yoga exercises with p value of 0.092 ( $p > 0.05$ ). Conclusion: Hatha yoga exercises had an effect on the quality of sleep but hatha yoga exercises had no effect on immunity.

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p-ISSN 2528-5998  
e-ISSN 2540-7945

## INTRODUCTION

Rest and sleep are the basic needs of everyone. Sufficient rest and sleep are required for the body to function normally. In sleeping condition, the body performs the recovery process to restore the body's stamina until it is in optimal condition (Wicaksono, 2015). The need of sleep in early adulthood is about 6 to 8.5 hours each night to maintain health (Agustin, 2012).

According to Wicaksono (2015) the need for adequate sleep, other than determined by the number of sleeping hours (quantity of sleep), is also by the depth of sleep and sleep satisfaction (sleep quality). In addition, the sleep quality of a person is said to be good if it does not show any signs of lack of sleep and he or she has no trouble in sleeping (Wicaksono, 2015). Subjective assessment on the quality of sleep consists of seven dimensions and if one of the seven dimensions is disrupted it will result in decreased quality of sleep (Magfirah, 2016).

Sleep disorder is one of the dimensions of sleep quality assessment. This is often found in the students during the preparation of the final project. According to Wulandari (2012) students in final Grade who were compiling the final project may experienced sleep disorder such as insomnia. In normal people, prolonged sleep disorder would result in the changes in the biological sleep cycle, fatigue and decreased body endurance. When the immune is in a declining condition, the body's defense will decrease and the body can be susceptible to illness and then becomes ill. Pressure in the immune system function will increase the susceptibility of a person to the occurrence of infectious diseases (Mayasari & Pratiwi, 2009).

Non-pharmacological therapy to improve sleep quality is necessary to minimize the effects of pharmacological therapy due to its non-side effects and dependence (Novianty, F. & Safitri, 2014). Yoga is one of the non-pharmacological therapies that has been known as the philosophical system of life of ancient Indian society. Yoga exercises can cause the effects of relaxation in order to increase the quality of sleep or improve the quality of sleep to be better. The combination of soft and restorative hatha yoga could provide an effective benefit for improving sleep, since the holistic order of meditation, breathing, and physical fitness required both active and passive involvement of skeletal muscle (Mustian, 2014).

The preliminary study was conducted on the students of public health postgraduate at Unnes class of 2015 who were preparing the

final project by giving questionnaires on sleep disorder and direct interview about health impact of preparing thesis to sleep disorder felt by them. The result showed that 31 students suffered from sleep disorders. The health impact showed that 6 students experienced fever, 11 experienced headaches, 14 experienced influenza and cough.

Based on those data and phenomena, this study aims to analyze the effect of Hatha Yoga Exercises on the Quality of Sleep and Immune System among the students in Public Health Postgraduate Program at Unnes.

## METHODS

The method used was quasi experiment with pretest and posttest control group design. The population in this study was all students in Public Health Postgraduate Program at Unnes. The samples were selected based on inclusion and exclusion criteria by purposive sampling technique. The samples obtained were 24 respondents, divided into two groups to perform hatha yoga exercises in the intervention group. The study instrument used was questionnaire and leukocyte examination.

The study period was July-August 2017. Data collection was obtained based on the results of sleep quality questionnaire and leukocyte examination. Data analysis was performed using the Wilcoxon test statistical test, T test and Mann Whitney with SPSS 16.

## RESULTS AND DISCUSSION

This study aims to analyze the effect of Hatha Yoga Exercises on the Quality of Sleep and Immune System among the students in Public Health Postgraduate Program at Unnes. The results will be described as follows:

### Quality of Sleep

**Table 1.** Analysis Result of Sleep Quality Difference Test In the Intervention and Control Groups Before and After Yoga Exercises among the students in Public Health Postgraduate Program at UNNES

Quality of Sleep of the Respondents			
Intervention			
	N	mean $\pm$ SD	P-Value
Before	12	7.83 $\pm$ 1.89	0.002
After	12	3.08 $\pm$ 0.90	
Control			
	N	mean $\pm$ SD	P-Value
Before	12	7.91 $\pm$ 1.62	0.438
After	12	7.41 $\pm$ 1.78	

Based on the analysis result it can be seen that, the mean of quality of sleep before the provision of hatha yoga exercises in the intervention group was  $7.83 \pm 1.89$  whereas after the provision of hatha yoga exercises it decreased to  $3.08 \pm 0.90$ . Based on wilcoxon test, the p value was 0.002 ( $p < 0.05$ ) which meant that there was a significant difference in the quality of sleep before and after yoga exercises in the intervention group.

Based on paired t test, p value in the control group was 0.438 ( $p > 0.05$ ) which meant that there was no significant difference in the quality of sleep between before and after yoga exercises. This suggested that in the control group who were not given hatha yoga exercises, the quality of sleep experienced by the students was not much different or it could be said to be constant.

There was a difference in the level of sleep quality among the students after being given hatha yoga exercises. Students who were given hatha yoga exercises showed better quality of sleep. This was due to hatha yoga exercises could cause a relaxation effect that could increase the quality of sleep or improved the quality of sleep to be better. The combination of soft and restorative hatha yoga could provide an effective benefit for improving sleep, since the holistic order of meditation, breathing, and physical fitness required both active and passive involvement of skeletal muscle (Mustian, 2014).

This is in accordance with Sindhu (2013) who stated that Hatha yoga was a training system that used various techniques of body posture (asana) accompanied by breathing techniques (pranayama) to achieve a balance between two different forces in the body, such as the upper body and lower body, the left side of the body and the right side of the body, inhale and exhale, positive energy and negative energy, etc. By practicing hatha yoga regularly, then we would be free from body stress, negative thoughts and emotions. It would also provide a boost to hormonal balance for maximum mental, spiritual and health improvements.

Based on the analysis, the respondents in the control group was less likely to control the problems faced so that although the level of problems experienced was still normal but the quality of sleep was already in a bad level. Excessive anxiety in the respondents will make them too hard in thinking so that they may have difficulty to control their emotions and this has an impact on increased tension and difficulty in starting sleep. This difficulty will disturb these respondents to get the desired quality of sleep.

Based on Wicaksono (2015) anxiety increased the level of norepinephrine in the blood through stimulation of the sympathetic nervous system, this chemical results in the change in the form of decreased stage 4 NREM and REM sleep and awakening.

## Imunity

**Table 2.** Analysis Result of Immunity Difference Test In the Intervention and Control Groups Before and After Yoga Exercises among the students in Public Health Postgraduate Program at UNNES.

Immunity of the Respondents			
Intervention			
	N	mean $\pm$ SD	P-Value
Before	12	10270.83 $\pm$ 2566.24	0.002
After	12	7714.16 $\pm$ 1588.59	
Control			
	N	mean $\pm$ SD	P-Value
Before	12	8760.00 $\pm$ 2651.73	0.438
After	12	9198.33 $\pm$ 2451.40	

Based on the results of the analysis, it can be seen that, the mean of immunity before the provision of hatha yoga exercises in the intervention group was  $10270.83 \pm 2566.24$  while after the provision of hatha yoga exercises it decreased to  $7714.16 \pm 1588.59$ . Based on paired t-test, the p value was 0.002 ( $p < 0.05$ ), which meant that there was a significant difference in immunity before and after yoga exercises in the intervention group.

A study in Oslo University, Norway revealed that yoga was not only related to decreased stress, but could decreased the incident of heart disease and had other health benefits. In a study conducted by some researchers in Norway, there was an evidence of the genetic impact of yoga on the immune system. The authors observed 10 participants who had yoga retreats during a week where they performed meditation, yoga postures, and yoga breathing exercises. The authors tried to observe the direction of participation before and after a four-hour yoga session and showed that yoga exercises altered the expression of 111 genes in immune cells, otherwise, music-based relaxation only altered the expression of 38 genes (Qu, Olafsrud, Meza-Zepeda, & Saatcioglu, 2013).

A study conducted by Mustian (2014) showed that hatha yoga exercises could improve the quality of sleep. When the quality of sleep improved then the immune system would also improve. According to the study conducted by Michael Irwin of the University of

California, lack of sleep caused changes in cytokine tissue. When we lacked of sleep, the immune system would work less effectively. The body would produce less melatonin that improved the immune system work. Therefore, we must be sure to sleep for at least seven to eight hours a day (Michael. R *et al.*, 2017) It is in line with the studies that have been conducted by the students of the Faculty of Medicine, University of Andalas, Sleep quality gave a good effect on the human body. It was found that the quality of sleep affected the number and counts of leukocyte, weight, blood pressure, and academic achievement(Nilifda *et al.*, 2016).

Based on paired t test, p value in the control group was 0.360 ( $p > 0.05$ ), which meant that there was no significant difference in immunity before and after the intervention in the control group.

In the control group which was not given hatha yoga exercises, the immunity of the students was not much different or could be said to be constant. This was due to there was no routine exercises such as hatha yoga given to the control group before and after the study to improve immunity. Rest and sleep are the basic needs of everyone. Sufficient rest and sleep are required for the body to function normally. In sleeping condition, the body performs the recovery process to restore the body's stamina until it is in optimal condition. Good and regular sleep pattern has a good effect on health (Wicaksono, 2015).

In normal people, prolonged sleep disorder would result in the changes in the biological sleep cycle, fatigue and decreased body endurance (Fathul L. *et al.*, 2013). According to Wicaksono (2015) sleep time less than the need could affect protein synthesis that play a role in repairing damaged cells to decrease.

**Analysis of the Effect of Sleep Quality Test in the Control Group and the Intervention groups**

**Table 3.** Analysis Result of the Effect of Sleep Quality Test in the Control Group and the Intervention groups After the Provision of Yoga Exercises to the Students of Public Health Postgraduate at UNNES.

Quality of Sleep of the Respondents			
	N	mean ± SD	P-Value
Control	12	7.41±1.78	0.000
Intervention	12	3.08±0.90	

Based on the analysis result of the effect of sleep quality between the control group and the intervention group after the provision of

Hatha Yoga using the non parametric test of Mann Whitney test, it was obtained p value of 0.000 ( $p < 0.05$ ) which showed that there was a significant difference between the intervention group and the control group. This meant that hatha yoga had an effect on the quality of sleep.

This may be due to the intervention group had a routine hatha yoga exercise that could to improve the quality of sleep. In other hand, the respondents in the control group had no changes in their routine activities to improve the quality of sleep. Therefore the respondents in the control group still had difficulty to start or maintain sleep.

According to (Hannatuzzahro, 2016) Hatha yoga could help normalize the workings of the sympathetic nervous and the parasympathetic nervous systems. The sympathetic and parasympathetic nervous systems are autonomic nervous systems that regulate the work of unconscious tissues and organs. Yoga works to relax the sympathetic nerves. At the same time yoga stimulates the parasympathetic nervous system that allows the body to rest and sleep. So Nucleus Supra Chiasmatic (NSC) that previously do not work normally because the sympathetic and parasympathetic nerves do not work, can work again normally. NSC will re-release hormone body temperature regulator, cortisol, growth hormone, and others which hold the role of waking up at the time of bright light stimulation into the eyes. If the night comes the NSC will stimulate the release of the melatonin hormone so that people can be sleepy and sleep. When NSC is normal then NREM and REM will be met so that the quality of sleep can be good.

**Analysis of the Effect of Immunity Test in the Control Group and the Intervention groups**

**Table 4.** Analysis Result of the Effect of Sleep Quality Test in the Control Group and the Intervention groups After the Provision of Yoga Exercises to the Students of Public Health Postgraduate at UNNES.

Imunity of the Respondents			
	N	mean ± SD	P-Value
Control	12	9198.33±2451.40	
Intervention	12	7714.16±1588.59	0.092

Based on the analysis result of the effect of immunity between the control group and the intervention group after being given yoga exercises using unpaired t test, the p value of 0.092 ( $p > 0.05$ ) was obtained, meaning there was no significant difference between the intervention group and the control group. This

meant that hatha yoga exercise had no effect on Immunity

A study conducted by Mustian (2014) showed that hatha yoga exercises could improve the quality of sleep, when sleep quality improved the immune system would also improve. According to Ackermann *et al.*, (2012) at bedtime, the body releases a hormone called cytokines and antibodies that play a role in warding off viral and bacterial infections.

The statistical test result stated that there was no effect on immunity in the control group and the intervention group. This was possibly because of factors that could affect the immune system such as nutrients consumed by respondents which were not studied by the authors, such as vitamins and minerals. One of the roles of vitamins and minerals is as an antioxidant that can strengthen the immune system of the human body (Siswanto *et al.*, 2013).

Other possibility in addition to nutritional intake in the respondents in this case is self control to control the problems they face so that although the quality of sleep was in the bad category, the immunity of the respondents was still in good condition because according to Gunawan in Mayasari & Pratiwi (2009) if humans had greater control over problems would have a better health and showed a better function of the immune system. So it can be said that the physical severity of the disease can be taken into account.

## CONCLUSION

Based on the study results and discussion it can be concluded that there was a significant effect on the quality of sleep between the control group and the intervention group after being given hatha yoga exercises. And there was no significant effect on the immunity between the control group and the intervention group after being given hatha yoga exercises.

Recommendation is to conduct a study on other factors related to the Analysis of the Effect of Hatha Yoga Exercises on the Quality of Sleep and Immune System that have not been studied in this study and also a study on the factors that can affect the quality of sleep and immune system among students in final Grade other than thesis preparation.

## REFERENCES

Agustin, D., 2012. Faktor-Faktor Yang Mempengaruhi Kualitas Tidur Pada Pekerja Shift Di PT Krakatau Tirta Tidur Pada Pekerja Shift Di PT. Krakatau Tirta.

*jurnal Keperawatan*, Program Studi Sarjana, p.10.

- Fathul Liulfa A, Pepin Nahariani, M. I. A. A. 2013. Hubungan Perubahan Pola Tidur Dengan Kejadian Migren Pada Mahasiswa Tingkat Iv Semester Viii Prodi S1 Keperawatan Di Stikes Pemkab Jombang. *Jurnal. Kesehatan*, 18–24.
- Hannatuzzahro, S. (2016). Perbedaan Kualitas Tidur Ibu Hamil Usia Kehamilan 30-35 Minggu Sebelum Dan Sesudah Senam Yoga Di Rb “Nw” Ungaran Tahun 2016. *Artikel Ilmiah*. diakses. tgl 20 januari 2017
- Mayasari., D., & Pratiwi, A. 2009. Hubungan Respon Imun Dan Stres Dengan Tingkat Kekambuhan Demam Tifoid Pada Masyarakat Di Wilayah Puskesmas Colomadu Karanganyar. *Jurnal Keperawatan UMS*, 13–18.
- Magfirah, I. 2016. Hubungan kualitas tidur dengan tekanan darah pada mahasiswa program studi s1 fisioterapi angkatan 2013 dan 2014 di Universitas Hasanuddin. *Jurnal Kesehatan*.
- Michael R. Irwin, Richard Olmstead, and J. E. C. 2017. Sleep Disturbance, Sleep Duration, and Inflammation: A Systematic Review and Meta-Analysis of Cohort Studies and Experimental Sleep Deprivation. *HHS Public Access*, 80(1), 40–52.  
<https://doi.org/10.1016/j.biopsycho.2015.05.014>.Sleep
- Mustian, Karen. 2014. Yoga as Treatment for Insomnia Among Cancer Patients and Survivors: A Systematic Review. NIH Public. 106-115. Access: 21 Oktober 2016.
- Nilifda, H., Nadjmir, & Hardisman. 2016. Hubungan Kualitas Tidur dengan Prestasi Akademik Mahasiswa Program Studi Pendidikan Dokter Angkatan 2010 FK Universitas Andalas. *Jurnal Kesehatan Andalas*, 4(1), 243–249.
- Novianty, F. & Safitri, W. A. 2014. Pengaruh Terapi Musik Keroncong Dan Aromaterapi Lavender (Lavandula Angustifolia) Terhadap Peningkatan Kualitas Tidur Lansia Di Panti Wredha Dharma Bhakti Kasih Surakarta. *Jurnal Keperawatan*, 1–8.
- Sindhu, P. 2013. Hidup Sehat dan Seimbang dengan Yoga. Bandung: Qanita
- Siswanto, Budisetyawati, F. E. 2013. Peran Beberapa Zat Gizi Mikro Dalam Sistem Imunitas. *Jurnal Gizi Indonesia*, 36(1), 57–64.
- Utama, E.S.A.D. *et al.*, 2014. Pada Lansia Berdasarkan Skor Pittsburgh Sleep Quality Index Di Panti Sosial Tresna Werdha.
- Wicaksono, D. W. 2015. Analisis Faktor

Dominan Yang Berhubungan Dengan Kualitas Tidur Pada Mahasiswa Fkultas Keperawatan Universitas Airlangga. *PhD Proposal*, 1. <https://doi.org/10.1017/CBO9781107415324.004>

Wulandari, R. P. 2012. Fakultas Rumpun

Science-Technology Ui Fakultas Rumpun Science-Technology Ui.

Qu, S. et al., 2013. Rapid Gene Expression Changes in Peripheral Blood Lymphocytes upon Practice of a Comprehensive Yoga Program. *PLoS ONE*, 8(4), pp.1-8.